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Zahava D./Doering, Wayne D./Perry/
Robert Shishko

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Non-available time (NAT) is defined as that time military personnel are diverted from their occupational duties. NAT is an important parameter of the military manpower requirement determination process, yet the Services define and measure NAT differently. Although the Air Force has the most detailed approach along with the most current data base for estimating NAT, the Air Force methodology may not be the most appropriate for DoD-wide application. OASD(MRA&L) must resolve certain issues before defining a NAT policy. A Task Force is recommended to coordinate DoD-wide actions. 52 pp. (Author)

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A RAND NOTE

NON-AVAILABILITY OF MILITARY MANPOWER

Zahava D. Doering, Wayne D. Perry,
Robert Shishko

October 1979

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PREFACE

This Note was prepared as part of Rand's Defense Manpower Studies Program, sponsored by the Office of the Assistant Secretary of Defense (Manpower, Reserve Affairs, and Logistics)--OASD(MRA&L). The study was performed under Task Order 78-I-3, Manpower Requirements Determination.

The purpose of this studies program is to develop broad strategies and specific solutions for dealing with present and future defense manpower problems, including the development of new methodologies for examining broad classes of manpower problems, as well as specific problem-oriented research. In addition, the program should contribute to a better general understanding of the manpower problems confronting the Department of Defense.

This Note deals with the methodologies and data sources used by the Services to estimate the non-available time (NAT) for military personnel, emphasizing individuals within the Continental United States assigned normal 40-hour workweeks. Non-available time is defined as that time when military personnel are diverted or absent from their assigned primary occupational duties. Because NAT is an important parameter in determining manpower requirements, this Note should be useful to those in the Department of Defense concerned with improving the determination process.

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SUMMARY

Since the Services have been reporting manpower requirements, the Office of the Secretary of Defense (OSD) has relied upon the Services' own estimates of the amount of time Service personnel are diverted or absent from their assigned primary occupational duties. This so-called "non-available time" (NAT) is composed of several categories of absences and diversions, including: ordinary and medical leave, various types of classroom and other training not provided on the job, permanent change of station (PCS) processing, other service-related diversions, and miscellaneous activities. Problems exist with current NAT estimates because the Services define and measure these individual NAT factors in different ways. First, there are no DoD-wide accepted definitions. Second, the Services' own terms are not directly comparable. Third, NAT estimates often do not account for the same collection of NAT factors or activities (for example, the Army's NAT estimates do not include training time, but the Air Force's and Navy's do). Fourth, the Services use different methods and data sources to estimate individual NAT factors. Finally, another problem with current NAT estimates is the use of out-of-date data and studies.

Improved estimates of non-available time will not necessarily improve estimates of manpower requirements at the work center level. The benefits of improving NAT estimates depend heavily on how accurate the work load measures are. Both problems--NAT and work loads--should be addressed together.

NON-AVAILABLE ACTIVITIES AND ESTIMATES

The Navy and Air Force consider a similar set of activities in estimating total NAT for those personnel with a 40-hour standard work-week; the Army considers significantly fewer non-available activities than the Navy and Air Force.

Total NAT--roughly 23 hours/month/man for the Air Force, 17 hours/month/man for the Army, and 29 hours/month/man for the Navy--masks many differences in individual NAT categories. Because Army TDA units do not

include the time lost to training, service diversions, social programs, and PCS-related activities, and the Navy collapses all of these factors into a catch-all category called *service diversions*, it is not possible at the present time, using existing staffing documents, to ascertain specific estimates within each NAT category for the Army and Navy. The Air Force, by contrast, has reported specific NAT estimates for these activities.

The Air Force appears to have the most detailed approach along with the most current data base for estimating NAT. The Air Force Management Engineering Agency's (AFMEA) analytic groups and Management Engineering Teams (METs), in conjunction with the sampling capability of the Air Force Military Personnel Center (AFMPC), periodically collect data from airmen and officers using self-administered questionnaires. The survey samples have been sufficiently large that analysis of NAT factors by subgroups--e.g., different workweeks, locations, men and women--is possible. Questionnaires have been designed both to collect NAT information that is not available from other sources and to duplicate some information that is also available from administrative and personnel records. The availability of similar information from different sources on ordinary and medical leave, training, and social programs permits a comparison of differences resulting from the different methods. AFMEA then decides which source to use for each NAT factor. The Navy also uses survey techniques and administrative records for NAT estimates; however, the Air Force's estimates are updated more regularly.

Studies conducted by the Army's Manpower Survey Teams (MST) at each Army Major Command provide estimates of NAT time due to medical and ordinary leave for Army TDA personnel. These MSTs are required to survey installations every three years to verify or update their manpower requirements. It is our impression that this updating is, in fact, not done on such a regular basis. More detailed NAT factors for Army TOE personnel are determined by the Manpower Authorization Criteria (MACRIT) program within the Army Training and Doctrine Command (TRADOC) as part of establishing combat manning requirements. For the TOE NAT factors, a combination of manpower surveys and industrial engineering techniques

are used. The MACRIT NAT factors are based on a study conducted in 1968 and may be outdated as a result of modifications in the activities of TOE personnel.

STRENGTHS AND LIMITATIONS OF CURRENT MEASUREMENT TECHNIQUES

Methodological developments in sample survey design now provide both the technology for selecting representative and efficient samples for almost any survey problem and techniques for increasing respondent cooperation during data collection. The survey approach is a feasible means of measuring NAT factors that are not measurable by existing administrative records.

Several problems with the AFMEA questionnaire may require attention before DoD-wide adoption of this approach. We recommend extensive testing of different time frames for identical items and alternative time-recording methods.

In a pretest of the *1978 DoD Survey of Officers and Enlisted Personnel* conducted by Rand with a sample of personnel from all four Services, respondents were asked questions concerning workweeks and NAT. The pretests revealed that official workweeks bore little resemblance to self-reported workweeks, and that respondents had difficulty accurately reporting NAT on an aggregate basis. The pretest experience in the four Services surveyed indicated that NAT estimates could not be collected on an omnibus survey, where question space was presumably at a premium. Rather, we recommend the development of special survey instruments composed of detailed questions that would cover Service-specific NAT activities within a well defined, easy to recall time period.

Discussions with military personnel about the utility of administrative records compared with other data (e.g., self-administered questionnaires) generally indicate a preference for administrative records. Such records are available for entire populations, administrative data are available for a number of years, and the data can easily be retrieved.

Although the general arguments may be persuasive, closer examination reveals a series of problems, including an inappropriate matching of administrative records with the size of population that may have engaged

in the NAT activity at issue and underreporting or no reporting of NAT for certain activities. Moreover, although most of the Services' records for major activities are centrally located and stored on computer files, some of these data are not and require time-consuming collection efforts from various sources.

If DoD-wide estimates of NAT from administrative records are undertaken, careful coordination between and within the Services would be required. At a minimum, it would be necessary to understand how administrative records are created and maintained. Issues of population coverage, reporting source, quality verification, etc. all need to be explored. In some cases, existing reporting schemes could be modified to permit analysis by subgroups--for example, CONUS or overseas. It may also be necessary to differentiate expected from actual behavior on administrative records. In sum, the use of administrative records requires the same care and caution as does the use of information collected through survey methods.

Small scale work-sampling efforts could improve manpower requirements determination at the micro level. However, this approach for a comprehensive DoD-wide study of NAT does not seem practical at this time.

SOME ISSUES CONCERNING NON-AVAILABILITY

Ostensibly, the current approach to non-availability is to measure the actual behavior of a sample of military personnel and to incorporate the average measured NAT into official service documents. With this positivistic approach, the sanctioned figures conform to measured behavior. In its extreme, this approach treats NAT as a parameter of the requirements process that is *not* amenable to manipulation by policy directives. In an alternative approach, which we call the normative approach, a Service would stipulate what NAT would be permitted in requirements calculations and, in doing so, would tend to force behavior toward the stated NAT. The conceptual approach, normative or positive, to non-availability is a basic policy decision that OASD(MRA&L) and the Services must make.

OASD(MRA&L) and the Services must also decide how many different parameters there should be for computing manpower requirements. Any resulting NAT policy should embody incentives that encourage the efficient scheduling of NAT activities at the work center level. OASD(MRA&L) must also encourage the Services to account for non-available (non-productive) time for combat units in a manner consistent with other wartime planning assumptions and practices.

THE TASK FORCE APPROACH

Should OASD(MRA&L) wish to improve NAT estimates, we recommend that a DoD Task Force be formed to coordinate DoD-wide measurement of current NAT factors. A Task Force appears to be the most effective organizational structure for documenting current practices and for establishing inter-service definitions, procedures, and measurement policies.

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The authors are responsible for any errors or omissions that may remain.

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I. INTRODUCTION

Since the Services have been reporting manpower requirements, the Office of the Secretary of Defense (OSD) has relied upon the Services' own estimates of the amount of time Service personnel are diverted or absent from their assigned primary occupational duties. This so-called "non-available time" (NAT) is composed of several categories of absences and diversions, including ordinary and medical leave, various types of classroom and other training not provided on the job, permanent change of station (PCS) processing, other service-related diversions,¹ and miscellaneous activities.² Problems exist with current NAT estimates because the Services define and measure these individual NAT factors in different ways. First, there are no DoD-wide accepted definitions. Second, the Services' own terms are not directly comparable. They include such diverse and colorful expressions as *non-productive time*, *indirect productive time*, *time not on the job*, *duty hours not available*, *"sick, lame, and lazy" time*. Third, NAT estimates often do not account for the same collection of NAT factors or activities; for example, the Army's NAT estimates do not include any training time, but the Air Force's and Navy's do. Fourth, the Services use different methods and data sources to estimate individual NAT factors; problems with these methods further complicate cross-service comparability.

Another problem with current NAT estimates is the use of out-of-date data and studies. The Army bases its NAT estimates for TDA (Table of Distribution and Allowances) units³ on a 1952 study and its NAT estimates for TOE (Table of Organization and Equipment) units⁴ on a

¹Service diversions include work details, Commander's call, parades and retreats, boards and councils, and physical training. There is no accepted DoD-wide definition of service diversion.

²Miscellaneous activities include voting, AWOL, desertions, and civilian or military courts and related confinement for less than 30 days.

³TDA units are non-deploying units of military and civilian personnel stationed at fixed CONUS installations.

⁴TOE units are deploying units of military personnel only.

1968 study.¹ The Navy bases its published NAT estimates on a 1969 study. All of these studies predate the All-Volunteer Force (AVF). In contrast, the Air Force updates its NAT estimates periodically, with the latest report published in 1978. There is no current DoD policy on updating NAT estimates.

NON-AVAILABILITY AND MANPOWER REQUIREMENTS

Why should OSD care about the quality of NAT estimates? The number of manhours military personnel are not available to perform their assigned primary duties is an important parameter in the manpower requirements determination process. Implicitly or explicitly, each Service divides the manhours required to accomplish a certain monthly work load at a given work center by the monthly available manhours per individual to obtain the number of individuals required:

$$\text{Number of individuals required at } i\text{th work center} = \frac{\text{Monthly manhours required for work load at } i\text{th work center}}{\text{Available manhours per month per individual}} .$$

The available manhours are determined by subtracting the estimated monthly NAT from assigned duty hours per month.

Although military units have standard workweeks or assigned duty hours per month fixed by policy directives,² these workweeks or duty hours generally vary by Service, type of unit, and deployment. Even if each Service were to have identical NAT definitions and estimates for all personnel, available manhours per month would vary across units. For an individual work center, the effect on manpower requirements of a

¹See "Estimates of Federal Employees Available Time for Work Distort Work Force Requirements," FPCD 78-21, General Accounting Office, March 6, 1978, and Directive from Lieutenant General A. S. Collins, Jr., Army Assistant Chief of Staff for Force Development, to Commanding General, Army Combat Developments Command, "Changes to Basic Planning Factors, AR 310-32," February 18, 1968.

²See for example, Army Regulation 570-5XX series (TDA), Army Regulation (TOE) 570-2, Op Nav Instruction 5330.8, and Air Force Regulation 28-3.

change in NAT definitions and estimates would depend on these factors; at a higher level of aggregation, the effect on requirements of a change in NAT definitions and estimates could be significant. The Air Force estimates, for example, that one additional hour of NAT per month for personnel assigned a 40-hour standard workweek can result in an increase of up to 1500 required end-strength manpower spaces.

That NAT is important for the computation of manpower requirements is clear from the manpower equation (p. 2); yet refined estimates of NAT may not only not improve estimates of manpower requirements, but may actually worsen them. Consider the case where the numerator of the manpower equation, the manhours required for the work load, is overstated; an improved estimate of NAT that is higher will exacerbate the overstated manpower requirements. Where the numerator of the manpower equation is understated, an improved estimate of NAT that is lower will accentuate the manpower shortfall. The benefits of improving NAT estimates depend heavily on how accurate the work load measures are. Both problems--NAT and work loads--should be addressed together.¹

Improving NAT (and work load) estimates will not resolve the manpower requirements issue. First, not all manpower requirements are determined by the manpower equation; a change in NAT would not affect these "spaces." Second, when the manpower equation applies, NAT affects only manpower requirements directly; *authorizations and actual assigned personnel* are affected only indirectly. Whether a work center is efficiently manned is then strictly problematical.

POLICY AND RESEARCH ISSUES

Discussion of non-available time sometimes confuses questions that should be resolved through research and questions that should be addressed within a policysetting process. Examples of research questions

¹The numerator could be faulty either because the independent variables determining the manhours required are incorrectly stated, or because the postulated relationship between the independent variables and the manhours required is itself incorrect. In general the manpower equation cannot accurately represent manpower requirements because no substitution is permitted between various classes of manpower.

are: Do existing computational methods adequately account for non-availability factors? What, if any, empirical data are used? How can the determination of NAT factors be improved? Related questions are: Does NAT vary significantly by personal characteristics (sex, rank) geographic location, or occupational characteristics?

A significant policy issue is the effect on wartime readiness of the way NAT is currently computed for Army TDA units and Navy CONUS shore units? Other policy questions relating to NAT are: Are wartime NAT factors consistent with other wartime planning? How many NAT factors should there be for computing manpower requirements? Would changing NAT affect productivity at the work center level? What quality standards should OASD(MRA&L) require the Services to maintain in computing NAT? How often should OASD require the Services to update NAT estimates?

SCOPE OF THIS NOTE

The scope of this Note is limited. Our intention is to document our work on the research questions described above and to raise certain policy issues that should be given careful thought *before* OASD(MRA&L) delineates a position on NAT. Section II will provide an overview of inter-service and intra-service differences concerning NAT activities, definitions, estimates, assigned workweeks, and NAT measurement techniques.¹ Section III compares the strengths and limitations of various NAT measurement techniques including individual surveys, existing administrative records, industrial engineering, and other methodologies. Section IV raises some issues concerning non-availability that would have to be addressed in any future attempt to measure NAT. Finally, Section V summarizes our conclusions and recommends future efforts by OASD in this area.

¹Only military personnel non-availability was investigated. Civilians were not included because of DoD resource constraints and because other government agencies and departments are studying NAT for civilian manpower.

II. INTER-SERVICE AND INTRA-SERVICE DIFFERENCES

In this section we provide an overview of inter-service and intra-service differences in workweeks, currently allowed (measured) NAT activities and times, and NAT measurement techniques.

STANDARD WORKWEEKS

Aside from the disparities in NAT definitions and methods cited in the Introduction, the Services prescribe different standard workweeks. These differences result in part from different missions across the Services. Even within a single Service, assigned duty hours per week may vary on the basis of Service-specific policies, depending on the type of unit (combat or non-combat), geographic location (CONUS, overseas, at sea), and condition (peacetime or wartime). Table 1 provides the range of assigned workweeks for the Air Force, Army, and Navy.

Although the Air Force has five different workweeks depending on the so-called "state-of-the-world," under peacetime conditions the majority of Air Force military personnel are *assigned* a 40-hour workweek. The great majority of Navy personnel, perhaps 70 percent, are assigned to shore installations in the CONUS or overseas where dependents are authorized. They have a 40-hour standard workweek.

About 75 percent of Army military manpower are in TOE units composed solely of military personnel. The remaining military personnel are in CONUS installations in TDA units, which include both civilian and military non-deploying support personnel.

NON-AVAILABLE ACTIVITIES AND ESTIMATES

We have identified seven *categories* of activities that require military personnel to be away from their primary duty stations: (1) ordinary leave, (2) medical leave, (3) education and training, (4) service diversions, (5) PCS-related diversions, (6) social programs, and (7) miscellaneous activities. The Services have different policies regarding which of these categories are to be allowed, and consequently measured, as NAT activities. Furthermore, even within a category that the Services agree ought to be measured, they disagree on what individual

Table 1
INTER-SERVICE AND INTRA-SERVICE WORKWEEKS

AIR FORCE
(Hours/Week)

Normal (CONUS/Europe/ Alaska)	Extended Normal (Philippines)	Extended Remote (Korea, Alaska, Europe)	Wartime Emergency	Wartime Surge
40	48	48	60	72

Source: *Air Force Regulation 28-3.*

ARMY
(Hours/Week)

TDA (CONUS)	TOE (CONUS & Overseas)
40	84

Sources: *TDA-Army Pamphlet 570-5XX series; TOE-Army Regulation 570-2.*

NAVY
(Hours/Week)

	At Sea	In Port (CONUS & Overseas)	Ashore (Overseas, dependents not authorized)
Watchstander	74	45	66
Non-watchstander	66	41	57

	<u>Ashore</u>
CONUS	} 40
Overseas where dependents authorized	

Source: *OPNAV Instruction 5330.8.*

activities are to be allowed. In order to contrast the different service policies, we chose the Air Force's list of non-available activities and identified those that the Army and Navy currently allow and measure for CONUS personnel having a 40-hour standard workweek. Table 2 displays the results.

As the table shows, the Navy and Air Force consider a similar set of activities in estimating total NAT for those personnel with a 40-hour standard workweek; the Army considers significantly fewer non-available activities than the Navy and Air Force.

The Army's NAT estimates for TDA units includes only ordinary and medical leave, whereas the other Services' NAT estimates include items from all non-miscellaneous categories. As one might expect, the total NAT estimate for CONUS personnel with a 40-hour standard workweek is lower for the Army than for the other Services. In Table 3, we show each Service's currently measured NAT broken down into the seven NAT categories for CONUS personnel with a 40-hour standard workweek.

The total NAT--roughly 23 hours/month/man for the Air Force, 17 hours/month/man for the Army, and 29 hours/month/man for the Navy--masks many differences in individual NAT categories computed by the Services. Because Army TDA units do not include the time devoted to training, service diversions, social programs, and PCS-related activities, and the Navy collapses all of these factors into a catch-all category called *service diversions*, it is not now possible to ascertain specific NAT estimates within each NAT category, using existing staffing documents. The Air Force, by contrast, reports specific NAT estimates for these activities. These are shown in Table 4.

To illustrate what differences the total NAT estimates shown in Table 3 might mean in terms of manpower requirements, we can use the AFMEA estimate that a one-hour change in monthly available time for personnel assigned a 40-hour standard workweek results on the margin in a change of between 1200 and 1500 end-strength manpower spaces.¹ If we accept this estimate, the Army would require *fewer* personnel and the

¹ Air Force Management Engineering Agency Briefing on Manpower Requirements Determination, 1977.

Table 2
INTER-SERVICE COMPARISON OF NON-AVAILABLE ACTIVITIES
(40-HOUR WORKWEEK)

Activity	Air Force ^a (CONUS)	Army ^b (TDA)	Navy ^c (Ashore)
<u>Leave</u>			
Ordinary and emergency	Yes	Yes	Yes
Pass	Yes	Yes	Yes
<u>Medical</u>			
Dental visits	Yes	Yes	No
Physical exams	Yes	Yes	No
Outpatient visits	Yes	Yes	Yes
Inpatient visits	Yes	Yes	Yes
Pregnancy related	Yes	(?)	(?)
<u>Education and Training</u>			
TDY training	Yes	No	Yes
General education/ancillary training	Yes	No	Yes
Military specialty testing	Yes	No	No
Educational testing	Yes	No	Yes
Answering surveys	Yes	No	No
<u>Service Diversions</u>			
Commander's call	Yes	No	Yes
Physical training	Yes	No	Yes
Counseling and reviews	Yes	No	Yes
Boards and councils	Yes	No	Yes
Parades and retreats	Yes	No	Yes
Charge and inspection of quarters	Yes	No	Yes
Additional duty/work details	Yes	No	Yes
<u>PCS Related</u>			
In/out processing	Yes	No	Yes
Family settlement	Yes	No	Yes
<u>Social Programs</u>			
Drug/alcohol rehabilitation	Yes	(?)	Yes
Drug/alcohol education	Yes	(?)	Yes
Human/race relations	Yes	(?)	Yes
<u>Miscellaneous</u>			
Voting	Yes	No	No
Court (military/civilian)	Yes	No	No
AWOL/desertion	Yes	No	No

^aCaptain Ronald C. Marcotte, "Military Man-Hour Availability Study: 40- and 48-Hour Workweeks," Manpower Research and Analysis AFMEA Report No. 78-1, September 1978.

^bTDA Staffing Guides, Army Regulation 570-5XX series.

^cOPNAV 12D series, July 1977.

Table 3
 INTER-SERVICE AVAILABLE AND NON-AVAILABLE TIME
 USED FOR 40-HOUR WORKWEEK CONUS REQUIREMENTS
 (Hours/month/man)

	Air Force	Army	Navy
Assigned time ^a	167.93	167.33	167.33
Non-available categories			
Leave	8.25	} 16.73	7.99
Medical	3.19		
Education and training	3.74		7.90
Service diversions	4.79		} 12.95 ^b
Social programs	0.32		
PCS related	2.09		
Miscellaneous	0.35		
Total NAT	22.73	16.73	28.84
NAT percent of assigned time	13.5	10.0	17.2 ^c
Total available time	145.20	150.60	138.49
Yearly hours available	1,742	1,807	1,662

Sources:

AFMEA Report No. 78-1, September 1978.

TDA Staffing Guides, Army Regulation 570-5XX series.

OPNAV 12D Series, OPNAVINST. 100.11D, July 1977.

^aExcludes holidays and weekends. Air Force assigned time is based on 365.25 days/year, and Army and Navy assigned time is calculated using 364 days/year (52 weeks/year x 7 days/week).

^bNavy service diversions include sick call.

^cThe Marine Corps also allows a total of 17 percent assigned time as NAT; however, Marine staffing documents do not specify the loss time associated with each non-available category.

Table 4
 AIR FORCE ESTIMATED NON-AVAILABLE TIME
 AND ACTIVITIES FOR CONUS 40-HOUR WORKWEEK
 (Hours/month/man)

Activity	NAT	Activity	NAT
<u>Leave</u>		<u>Service Diversions</u>	
Ordinary and emergency	8.21	Commander's call	1.12
Pass	0.04	Boards and councils	0.62
Subtotal	8.25	Physical training	0.25
<u>Medical</u>		Counseling and reviews	0.64
Dental visits	0.42	Parades and retreats	0.34
Outpatient visits	0.47	Charge of quarters	0.36
Inpatient visits	1.70	Quarters inspection	0.17
Pregnancy related	0.40	Additional duties	0.52
Physical exams	0.21	Work details	0.78
Subtotal	3.20	Subtotal	4.80
<u>Education and Training</u>		<u>PCS-Related</u>	
TDY technical training	1.13	In/out processing	0.67
Military and education testing	0.47	Family settlement	1.43
High school and individual development	0.08	Subtotal	2.10
General education and ancillary training ^a	1.85	<u>Miscellaneous</u>	
Answering surveys	0.21	Voting	0.08
Subtotal	3.74	AWOL/deserter	0.04
<u>Social Programs</u>		Court	0.23
Drug/alcohol rehabilitation	0.08	Subtotal	0.35
Drug/alcohol education	0.15		
Human/race relations	0.10		
Subtotal	0.33		

Source: AFMEA Report No. 78-1, September 1978.

^aIncludes such training as: Squadron Officers School, NCO Academy, Military Conduct/Leadership School, Marksmanship, Effective Writing, Remedial Reading, Survival Training, Administrative Training, Medical Training, Driver Education, Nuclear Fuel Cycles and Weapons Proliferation, and so on. For more information, see letter from Lieutenant General B. L. Davis, USAF DCS/PERS to ALMATCOMSSA/CC, "Ancillary Training Review" (a copy with attachments received August 8, 1978).

Navy more personnel than the Air Force to perform the same work load. Extrapolation using the Air Force's estimate would not be correct beyond marginal changes in NAT.

TOE Personnel

The Army treats TOE personnel non-availability as a separate problem and uses the term *non-productive time*. Army Regulation 570-2 specifies that time be allowed in determining TOE manpower requirements for guard duty, K.P. (kitchen police), work details, eating and personal needs, and casualties. The first three items might be classed as *service diversions*, whereas the last item is TOE unique.

Table 5 shows the currently accepted percentages of assigned hours TOE personnel spend in non-productive activities. In the aggregate, non-productive time amounts to over 85 hours/month/man, although this must be viewed in the light of the 84-hour assigned workweek for TOE units. The validity of certain of these percentages is discussed in Section IV.

Shipboard Personnel

The Navy treats shipboard personnel non-availability as a non-productive time problem. In February 1979, the Navy Manpower and Material Analysis Center at Norfolk, Virginia (NAVMMACLANT) completed

Table 5
ARMY TOE NON-PRODUCTIVE TIME USED FOR
84-HOUR WORKWEEK REQUIREMENTS^a

Activity	Percent of Assigned Hours	Annual Manhours
Guard duty	5.33	234
K.P. (kitchen police)	2.00	88
Work details	3.33	146
Messing	6.24	273
Personal needs	4.10	180
Casualties	3.00	130
Total	24.00	1,051

^aSource: Army Regulation 570-2, Change 9, p. 2-3.

the data collection and preliminary analysis of non-productive time for shipboard enlisted personnel. Data were collected on approximately 5300 individuals aboard 18 ships. Non-productive categories measured included leave, medical, service diversions, training, and certain miscellaneous activities.¹ Shipboard service diversions consisted primarily of at-sea and in-port inspections. The training activities measured were training on board ship (except OJT), drills and practices, and onshore training. Detailed non-available time factors for these categories are not available to us at this time. The implications of the Navy's approach are briefly discussed in Section IV.

NAT DATA SOURCES

The Services use several methodologies to collect data for estimating NAT. These include questionnaires on which individuals record time spent on a range of activities, extracts from administrative and personnel records maintained for other purposes, and, to a limited extent, industrial work-sampling techniques in which individuals are observed as they perform various tasks. The strengths and limitations of these measurement techniques will be examined in greater detail in Section III. The data sources used by the Services are summarized here as background to the following discussion.

The Air Force appears to have the most detailed approach along with the most current data base for estimating NAT. The Air Force Management Engineering Agency's (AFMEA) analytic groups and Management Engineering Teams (METs), in conjunction with the sampling capability of the Air Force Military Personnel Center (AFMPC), periodically collect data from airmen and officers using self-administered questionnaires. The survey samples have been sufficiently large that analysis of NAT factors by subgroups--e.g., different workweeks, locations, rank and sex--is possible. Questionnaires have been designed both to collect NAT information not available from other sources and to duplicate some information also available from administrative and personnel records. The availability of similar information from different sources on ordinary and

¹The miscellaneous category includes personal needs, counseling, hearings of accused personnel, and social programs.

medical leave, training, and social programs permits a comparison of differences that result from the different methods. AFMEA then decides which source to use for each NAT factor. The Navy also uses survey techniques and administrative records for NAT estimates; however, their estimates are not updated as regularly as those for the Air Force. The most recent study conducted by the Air Force was in 1978; the Navy data base uses a 1968 study.

Studies conducted by the Army's Manpower Survey Teams (MST) at each Army Major Command provide estimates of NAT time due to medical and ordinary leave for Army TDA personnel. These MSTs are required to survey installations every three years to verify or update their manpower requirements. It is our impression that the updating of NAT estimates is, in fact, not very regular. More detailed NAT factors for Army TOE personnel are determined by the Manpower Authorization Criteria (MACRIT) program within the Army Training and Doctrine Command (TRADOC) as part of establishing combat manning requirements. For the TOE NAT factors, a combination of manpower surveys and industrial engineering techniques are used. The MACRIT NAT factors are based on a study conducted in 1968 and may be outdated as a result of modifications in the activities of TOE personnel.

III. STRENGTHS AND LIMITATIONS OF CURRENT MEASUREMENT TECHNIQUES

The preceding sections used the NAT factors developed by the Air Force as a standard against which to compare NAT factors utilized by the other Services. Although the Air Force methodology may be compatible with the uses to which the resultant NAT factors are put, other approaches may prove more feasible for the other Services. In addition, the Air Force methodology may not necessarily be the most appropriate for the determination of NAT factors that can be used in DoD-wide comparisons. The purpose of this section is to review a range of techniques that can be used in collecting data for inter-service comparisons, as well as to identify their strengths and limitations. Some of the issues raised have implications for future data collection efforts; possible solutions are indicated as part of the discussion.

GENERAL ORIENTATION

If we assume that NAT factors should be based on accurate measurement of actual behavior--that is, positive measurements--as opposed to establishing standards to which behavior should adapt, we have only two measurement perspectives: primary or secondary reporting of behavior. In the first category, we can group a range of alternatives by which individuals report on their behavior including self-administered questionnaires, personal interviews, and detailed time diaries. The second category includes direct observations of individuals and reports on the assumed behavior of individuals filled out by others. Both categories can further be divided on the basis of whether the reporting is designed specifically for the estimation of NAT factors or is a by-product of another activity. Thus, NAT factors can be estimated from surveys such as those designed by AFMEA or deduced from reports by individuals collected as part of another activity--for example, attendance data maintained by schools, clinic visits, and other administrative records.

SURVEY RESEARCH: PRIMARY DATA SOURCES

Critiques of sample surveys as data collection modes, whether the questionnaires are designed for self-administration or for use by interviewers, usually emphasize the sample design and problems connected with respondent willingness to participate--response rates. Less frequent are critiques of the cognitive demands of the questionnaires themselves as factors both in respondent motivation to participate and in data quality.

Survey Research Considerations

Methodological developments in sample survey design now provide the technology for selecting representative and efficient samples for almost any survey problem. In designing samples from which to collect data specifically for estimating NAT factors, precautions must be taken to ensure that enough sample points are available for measuring behaviors that are found infrequently in the population. Some activities--e.g., physical fitness exams--are distributed throughout the population but are generally of short duration. Other activities--e.g., membership on boards or councils--are distributed in a binary fashion. Thus, sampling plans must be sensitive to the large variance in the behavior being measured.

An appropriate sampling plan cannot, however, be proposed without prior agreement about the desired levels of accuracy and reliability. These levels, in turn, cannot be determined without agreement on both the population subgroups for which NAT estimates are required and the specific NAT activities to be measured. When one uses data from studies designed for other purposes, sample designs must be evaluated to ensure that the designs did not select individuals with atypical behavior patterns with respect to NAT--for example, samples of students.

Concerns about obtaining statistically significant response rates have also led to the development of a wide range of techniques designed both to increase respondent cooperation as part of the data collection and to assess the data when less than complete cooperation is obtained. The subject matter being studied, especially its importance to the respondent, influences the extent of respondent cooperation. However,

we have no reason to believe that NAT-oriented surveys are more or less prone to the standard reasons for lack of cooperation.

The low response rates characteristic of military surveys may have implications for the NAT factors being estimated. For example, a differential response rate may be expected between individuals having high and low NAT levels. In planning for NAT survey efforts, one should explore procedures to minimize differential participation. For example, military time could be explicitly allocated to the survey effort; if mail surveys are used, special follow-up might be designed for individuals who were in the relocation process, etc.

The relationship between the cognitive demands of the questionnaire itself and respondent motivation requires further discussion. Responding to questions requires effort and the willingness to expend the effort. In addition, the information required should also be easily available to the respondent. Some items, for example "pay-grade," require little effort; others, for example "total income, before taxes and other deductions, from all military and civilian sources for all of last year--1978," require considerable effort. Respondents perform well only those activities that are easy and acceptable. More highly educated respondents consistently perform better both in responding and in the quality of information for several reasons, including greater skill and experience in reporting behavior.¹

The difficulty of the task influences not only how well it is likely to be performed, but also the likelihood of participation. From a cognitive perspective, questionnaires need to be evaluated for the following characteristics: Language, sentence syntactic or structural complexity, concept complexity and clarity, clarity of response categories, instructions and questionnaire format. Although these factors are cognitive, they have important motivational implications. The more demanding the task, the greater the effort needed for adequate performance and, as a result, the greater the motivation required.

¹Christopher Scott, "Research on Mail Surveys," *Journal of the Royal Statistical Society*, Vol. 124, No. 2, 1961, pp. 143-205.

Two types of questions apparently require especially strong motivation: those that require recall or information and those that are considered personal or somehow threatening. In personal interviews, the interpersonal interaction often helps alleviate these problems; in self-administered questionnaires, the burden of encouraging "good" performance is both external to the questionnaire and lies in the characteristics of the questionnaire itself.

The above discussion was provided as a background against which to consider survey methods for the collection of NAT factors. It should highlight our concern for factors other than sample design or questionnaire return rates. We do not want to understate the importance of sampling and response rate consideration in NAT surveys. However, we prefer to view the problem of using survey methods for NAT estimation as one of understanding how to maximize the quality of a respondent's reporting job. Obviously, at one end of a continuum is a respondent who fails to return the questionnaire. A range of orientations lies between an unreturned questionnaire and one that is "ideally" filled out by a respondent who considered each question carefully, made an effort to collect the best information, evaluated each response, and responded completely and accurately. Before one relies on survey methods, the "performance" of respondents along such a reporting continuum should be assessed, together with the questionnaires themselves.

The AFMEA Survey

We do not have access to detailed information about how the sample design for the AFMEA study was developed. Existing documentation indicates that the sample size was determined by HQ AFMPC/MPCYP and that 11,534 individuals were selected on the basis of an estimated return rate of 60 percent. The sample was stratified by sex, officer/enlisted, overseas/CONUS.

To ensure a good return rate, the surveys were administered by the Management Engineering Teams. Part of the MET instructions allowed for substitution of respondents; that is, if a specific sampled respondent was not available, the METs were allowed to *substitute* another individual with similar characteristics (sex or officer/enlisted, because

location would be automatic). AFMEA does not know the extent to which substitution took place; however, this approach to survey administration resulted in a total of 8900 questionnaires being available for analysis, or 77 percent of the original number selected.

Several problems with the AFMEA questionnaire may require attention before DoD-wide adoption of this approach. The questionnaire asks the respondent to reconstruct the time spent in a wide range of activities during a *one-year* period. Although some of the activities may be very important to the respondent--for example, participation on boards or councils--others may be subject to serious recall problems--for example, hours worked overtime. Nothing we know of indicates that a one-year recall period provides data that are not subject to distortion. The distortion can be completely unintentional; the respondent may find it easier to report the "expected" behavior for any activity as opposed to the "actual" behavior. For example, respondents must be aware of the average amount of time allowed by regulation for Commander's call, and rather than reconstruct precise attendance, it is easier to report the norm. Before the AFMEA time frame of one year is adopted, we recommend extensive testing of different time frames for identical items and a comparison of results.

An additional problem with the present AFMEA questionnaire is a tendency for a question to contain several concepts and for questions to overlap in the information required. The items related to educational activities, testing, OJT, etc. illustrate some of these problems.

Another methodological issue in the AFMEA questionnaire relates to the response categories available to the respondent. In most cases, respondents are given a set of response categories in *two-hour* ranges, and are asked to assign the time spent to a category. The lowest category is "none," and the two-hour ranges go to a maximum of between 34 and 60 hours, depending on the item. As currently designed, the respondent has no way to indicate precise time, even for activities in which recall is not a problem. The use of these categories presents an analytic problem--that is, what value should be assigned to a time range? According to AFMEA, the *mid-point* of each category is used in

their analyses, with the maximum value an assumed "mid-point" of the highest (open-ended) category (e.g., "34 or more hours" is analyzed as 35 hours). Furthermore, because the response categories are not contiguous, the result of the mid-point approach is to create responses that are at 3-hour intervals, that is, the response categories 1-3, 4-6, 7-9, etc. are analyzed as 2, 5, and 8 hours. Without detailed information on the actual time distributions respondents may indicate with an alternative approach (e.g., questionnaire boxes on which to enter a time), we have no way of knowing how much artificial homogenization is entering the analysis. Again, before this approach is adopted on a DoD-wide basis, we believe extensive testing of alternative time recording methods is appropriate.

The AFMEA staff certainly recognize some of the issues of wording, response categories, conceptual problems, etc. The appendix to their study, for example, contains a list of survey items not utilized for methodological reasons. The most recent AFMEA study is certainly a more sophisticated effort than the earlier attempts. For example, in earlier years the NAT items were less detailed and included on questionnaires that contained other topics, whereas the current study is detailed and the data were collected in a special questionnaire designed solely for NAT estimation. Attention to some of the issues raised here, however, might enhance future AFMEA efforts as well as any DoD-wide survey.

1978 DoD Survey of Officers and Enlisted Personnel

Since 1971, the Department of Defense has conducted large-scale surveys of military personnel at approximately two-year intervals. These surveys have been administered across the Services and have been designed to provide defense analysts with a measure of the attitudes military personnel have toward a number of programs and policies instituted by the DoD, as well as to give estimates of specific behaviors and characteristics.

The *1978 DoD Survey of Officers and Enlisted Personnel*, fielded in January 1979, was designed as an umbrella survey rather than a survey directed toward collecting data with which to analyze one specific problem or evaluate a specific program. The interests of the users--

both identified and potential--range across all aspects of personnel policies both at the OSD level and in the Services. Offices in MRA&L, the Services, and the Rand staff working on specific problems were given an opportunity to participate in the identification of data requirements for the survey.

Among the candidates for data to be collected through this survey were several variables related to NAT. First, some interest was expressed in understanding the work patterns of military personnel, particularly with respect to the number of hours worked and the normal schedule for work. In addition, interest was expressed in including items that would obtain estimates of those NAT categories not generally available from other sources, especially in the areas of education and training and organizational duties, work details, and other service diversions.

The Pretests. So many items were proposed for the survey that we designed two questionnaires for pretesting. Each questionnaire had one variant suitable for officers and one for enlisted personnel. We conducted the pretest of all four variants of the *1978 DoD Survey* with officers and enlisted personnel from each of the four Services.¹ At each installation the pretest was administered to two groups of about 15 officers and two groups of about 30 enlisted persons. A reasonable cross-section of pay grades, racial groups, and occupational specialties was represented. The format for each of the 16 two-hour sessions was identical: Following a brief introduction, we administered the questionnaire and then conducted a discussion to obtain the respondents' reactions and to collect specific comments and problems. In addition, between sessions and at the end of each day, we held less structured discussions with various military personnel.

¹The pretest sample included personnel from the Marines (Quantico, Virginia, 29 August), the Air Force (Langley AFB, 30 August), the Navy (Norfolk, Virginia, 3 August), and the Army (Fort Dix, New Jersey, 7 September).

In all four variants, respondents were asked three items designed to capture their work schedules:

1. Which of the following best describes your current normal work schedule at your company, section, shop or work unit?

Circle One

Regular Daytime Hours (Monday - Friday) 1
 Regular Daytime Hours (Days other than Monday -
 Friday, e.g., Tuesday - Saturday) 2
 Shift Work (e.g., swingshift, nightshift, other). . . 3
 Flextime (You schedule your own hours, so long
 as you work the required number of hours per
 week) 4
 Other 5

Specify: _____

2. What is your official workweek as specified by your unit's policies or directives?

Circle One

40 Hours a Week 1
 48 Hours a Week 2
 60 Hours a Week 3
 72 Hours a Week (24 hours/day, 3 days/week) 4
 72 Hours a Week (12 hours/day, 6 days/week) 5
 Other 6

Specify: _____

3. During your *last official work week*, how many hours did you actually work at your company, section, shop or work unit?

Number of hours worked
 last official work week _____

The distributions of responses to these items, for all four Services combined, are shown in Tables 6, 7, and 8. The comments below are based on the tables, a set of Service-specific distributions (not

Table 6
DESCRIPTION OF CURRENT WORK SCHEDULES,
OFFICERS AND ENLISTED PERSONNEL

Schedule Descriptions	Officers		Enlisted Personnel	
	No.	Percent	No.	Percent
Regular daytime hours (Monday-Friday)	69	70	141	66
Regular daytime hours (Other than Monday-Friday)	--	--	2	1
Shift work	5	5	32	15
Flextime	2	2	5	2
Other	23	24	33	16
Total	99	101	213	100
Missing ^a	1		11	

Source: 1978 DoD Survey Pretest.

^aMissing data, illegible, multiple codes, etc.

included), and discussions with respondents. For the purpose of evaluating the items, the numbers of both officers and enlisted personnel who had difficulty in describing either the "normal work schedule" or the "official workweek" are important. Tables 6 and 7 show that about 15 percent of enlisted personnel and at least 20 percent of officers used the "other" category for their responses. Respondents from the Army, Navy, and Marines tended to use the "other" classification more than those from the Air Force, with the Navy sample having the greatest number of difficulties. In addition, a group of enlisted personnel either skipped the items, wrote "don't know" in the margin, or marked several codes.

Individuals conducting the pretests encountered rather dramatic reactions to the questions about official work hours. Many respondents

Table 7
 SELF-REPORTS OF "OFFICIAL WORK WEEK,"
 OFFICERS AND ENLISTED PERSONNEL

Official Work Week	Officers		Enlisted Personnel	
	No.	Percent	No.	Percent
40 hours a week	68	68	130	62
48 hours a week	4	4	26	13
60 hours a week	6	6	11	5
72 hours a week (24 hours/day, 3 days/week)	1	1	2	1
72 hours a week (12 hours/day, 6 days/week)	1	1	5	2
Other	20	20	35	17
Total	100	100	209	100
Missing ^a	0		15	

Source: 1978 DoD Survey Pretest.

^aMissing data, illegible, multiple codes, etc.

indicated that what was supposedly their official work schedule had little bearing on their working lives. From their perspective, the official work is complete "when the work is completed." The format provided no way for respondents to indicate the days or hours they are on call, a status they consider as part of their work time. Although a substantial number of respondents, in fact, worked "normal" hours, most military personnel were either amused or irritated at the attempt to express what they see as irrational schedules in some rational way. (As a point of comparison, other items in the questionnaire provided response category problems for less than 8 percent of respondents.)

Discussions with AFMEA personnel indicated that Air Force respondents also encountered problems with these items and, in fact, information outside of the questionnaire was used for final allocation--that

Table 8
 SELF-REPORTS OF NUMBER OF HOURS WORKED IN "LAST OFFICIAL WORK WEEK,"
 OFFICERS AND ENLISTED PERSONNEL

Number of Hours	Number			Per- cent	Number of Hours	Number			Per- cent
	Offi- cers	En- listed	Total			Offi- cers	En- listed	Total	
None	--	2	2	0.7	55	2	5	7	2.3
10	--	3	3	1.0	56	2	4	6	2.0
12	--	2	2	0.7	58	3	1	4	1.3
15	--	1	1	0.3	60	12	8	20	6.6
20	1	4	5	1.6	62	--	3	3	1.0
25	1	2	3	1.0	65	2	1	3	1.0
30	--	5	5	1.6	68	--	2	2	0.7
32	--	2	2	0.7	70	1	1	2	0.7
33	--	1	1	0.3	71	--	1	1	0.3
35	1	5	6	2.0	72	1	4	5	1.6
36	--	4	4	1.3	75	--	1	1	0.3
38	--	2	2	0.7	80	1	2	3	1.0
40	18	61	79	26.0	82	--	2	2	0.7
41	--	2	2	0.7	84	--	4	4	1.3
42	3	5	8	2.6	85	--	1	1	0.3
43	4	5	9	3.0	88	1	--	1	0.3
44	2	4	6	2.0	90	1	--	1	0.3
45	10	10	20	6.6	92	1	--	1	0.3
46	3	2	5	1.6	93	1	1	2	0.7
47	1	2	3	1.0		--	--	--	--
48	8	15	23	7.6					
49	1	3	4	1.3					
50	8	17	25	8.2					
51	--	1	1	0.3					
52	3	2	5	1.6					
53	--	1	1	0.3					
54	4	4	8	2.6					
Total						96	208	304	100.0
Missing ^a						4	16	20	
Mean hours						50.59	45.71	47.25	
Standard deviation						12.42	14.69	14.19	

Source: 1978 DoD Survey Pretest.

^aMissing data (left blank by respondent).

is, by asking the respondent the command of assignment, the level of assignment (e.g., Air Division, Wing, etc.) and the functional area or organization of the job, both the "official work week" and the "normal work schedule" could be imputed based on Air Force standard work weeks.

The third item, "hours of actual work" during the last official work week also presented problems. As the distribution in Table 8 shows, hours recorded range from 10 to 93, with an expected clustering at both 40 and 48-50 hours. Some respondents were confused about the use of the word "work" and indicated that "working" and "just being there on duty" were different concepts. Officers were unclear about distinctions between "required" work and hours spent completing a task. Furthermore, respondents had difficulty in knowing whether or not to include hours on call, on alert status, or being on a duty roster. Again, a portion of the respondents simply chose not to answer.

As we revised the questionnaires, we concluded that military personnel can reconstruct work schedules for a finite period of time (e.g., the last x number of days), but that the merge between the self reports and "official" periods of accounting needs to be undertaken with great care. In addition, a more precise definition of what is to be included in the term "work" should be provided.¹

The two pretest questionnaire items directly relating to NAT are given below:

1. In your *last official workweek*, how many hours did you spend during official work hours in training, study, attending lectures, or being tested? (For example, military conduct, first aid, security, disaster preparedness, driver education, race relations, drug abuse, correspondence course exams, specialty knowledge tests, promotion tests, physical fitness exams, etc.) *Do not include OJT.*

Number of Hours _____

¹As a point of information, the final set of items about work schedule included in the 1978 survey is reproduced in Appendix B.

2. In your *last official workweek*, how many hours did you spend during official work hours performing organization duties, work details, or service diversions? (For example, quarters inspections, ceremonies, parades, retreats, commanders call, physical fitness program, boards and councils, base inventories or clean-up, staff duty, officer/NCO officer of the day, kitchen duty, etc.)

Number of Hours _____

The pretest distributions of responses for the total samples are given in Tables 9 and 10. The range of answers either points to an underlying problem respondents faced in allocating their time or reflects the "true" distribution for those activities. In addition, these two items have contaminated responses because of respondents' difficulty with the term "official workweek." In designing these questions, we alternated between asking a long series of subitems dealing with each of the activities involved and the more global approach. We opted for the more global approach, initially believing that it would be easier for respondents. Our general conclusion, based on examining the questionnaires and discussing the items with respondents, is that the questions were too difficult to answer accurately.

Conclusions from Pretest Experience. The pretest experience indicated that NAT estimates could not be collected on an omnibus survey, where question space was presumably at a premium. Rather, further efforts in this direction would have to entail the development of special survey instruments composed of detailed questions that would cover Service-specific NAT activities within a well defined, easy to recall time period. In addition, special care has to be taken with the construction of items to eliminate ambiguities in language, definitions, and response categories.

ADMINISTRATIVE RECORDS: SECONDARY DATA SOURCES

The most recent NAT study conducted by AFMEA, as well as work conducted by the other Services, places heavy reliance on data from existing

Table 9

NUMBER OF HOURS SPENT DURING "LAST OFFICIAL WORK WEEK"
IN TESTING, STUDY, ATTENDING LECTURES OR BEING TESTED
OFFICERS AND ENLISTED PERSONNEL

Number of Hours	Number			Percent
	Officers	Enlisted	Total	
0	34	47	81	53.6
1	2	7	9	6.0
2	2	8	10	6.6
3	4	3	7	4.6
4	3	5	8	5.3
5	1	5	6	4.0
6	--	3	3	2.0
8	3	1	4	2.7
10	1	3	4	2.7
11	--	1	1	.7
12	--	4	4	2.7
16	--	2	2	1.3
18	--	1	1	.7
22	1	--	1	.7
25	--	1	1	.7
32	--	1	1	.7
40	1	6	7	4.6
44	--	1	1	.7
Total	52	99	151	100.3 ^b
Missing ^a	1	5	6	
Mean hours	2.52	5.89	4.73	
Standard deviation	6.45	11.02	9.83	

Source: 1978 DoD Survey Pretest.

^aMissing data (left blank by respondent).

^bDiffers from 100.0 percent because of rounding.

administrative and personnel records--that is, information extracted from data systems created for specific administrative purposes across a range of agencies and then statistically transformed for use in NAT estimates.

In the 1978 AFMEA study, more than half of the total NAT for CONUS personnel with a 40-hour workweek was derived from the administrative records of various Air Force agencies.¹ For each non-available category, Table 11 shows the percentage of total NAT that was calculated from self-administered questionnaires and the percentage that was calculated from existing administrative records. The sources from which the data were obtained are listed in Table A.1 in Appendix A; Tables A.2 and A.3 provide similar data sources for the Army and Navy respectively.

Discussions with military personnel about the utility of administrative records compared with other data (e.g., self-administered questionnaires) generally indicate a preference for administrative records. Such records are available for entire populations; data are available for a number of years and can be easily retrieved. Although such arguments may be persuasive, closer examination of available records reveals a series of problems that should be taken into account in future work.

Most of the data used in the estimates are stored on computer files at various Service personnel or financial agencies. However, because these agencies use different reporting systems,² the raw data must be manipulated and transformed to conform to common definitions and consistent units of measurement. For example, certain leave data are reported in calendar days taken per year, training data in daily student loads, and medical data in number of visits and average hours per visit.³ Once the data are transformed into hours per month, the

¹About 72 percent of the total NAT, however, could have been based on Air Force administrative records.

²Reporting methods include real time computer reporting through terminals, monthly coded data or administrative forms, quarterly telephone calls, and so on.

³See the 1978 AFMEA study for examples of conversion methods used and some of the assumptions underlying conversion factors.

Table 10
 NUMBER OF HOURS SPENT "DURING LAST OFFICIAL WORK WEEK" IN
 ORGANIZATION DUTIES, WORK DETAILS OR SERVICE DIVERSIONS
 OFFICERS AND ENLISTED PERSONNEL

Number of Hours	Number			Percent
	Officers	Enlisted	Total	
0	11	30	41	26.6
1	3	5	8	5.3
2	4	9	13	8.6
3	2	4	6	4.0
4	7	3	10	6.6
5	6	6	12	8.0
6	1	6	7	4.6
7	1	3	4	2.7
8	1	8	9	6.0
10	3	5	8	5.3
11	--	1	1	.7
12	--	3	3	2.0
16	1	2	3	2.0
20	--	1	1	.7
23	--	1	1	.7
24	1	--	1	.7
27	--	1	1	.7
30	1	2	3	2.0
32	1	2	3	2.0
36	--	1	1	.7
39	--	1	1	.7
40	4	1	5	3.3
48	--	1	1	.7
50	--	2	2	1.3
60	4	--	4	2.7
65	1	--	1	.7
82	1	--	1	.7
Total	53	98	151	100.0
Missing ^a	0	6		
Mean hours	14.62	8.00	10.32	
Standard deviation	21.24	11.81	16.09	

Source: 1978 DoD Survey Pretest.

^aMissing data (left blank by respondent).

administrative and personnel records--that is, information extracted from data systems created for specific administrative purposes across a range of agencies and then statistically transformed for use in NAT estimates.

In the 1978 AFMEA study, more than half of the *total* NAT for CONUS personnel with a 40-hour workweek was derived from the administrative records of various Air Force agencies.¹ For each non-available category, Table 11 shows the percentage of *total* NAT that was calculated from self-administered questionnaires and the percentage that was calculated from existing administrative records. The sources from which the data were obtained are listed in Table A.1 in Appendix A; Tables A.2 and A.3 provide similar data sources for the Army and Navy respectively.

Discussions with military personnel about the utility of administrative records compared with other data (e.g., self-administered questionnaires) generally indicate a preference for administrative records. Such records are available for entire populations; data are available for a number of years and can be easily retrieved. Although such arguments may be persuasive, closer examination of available records reveals a series of problems that should be taken into account in future work.

Most of the data used in the estimates are stored on computer files at various Service personnel or financial agencies. However, because these agencies use different reporting systems,² the raw data must be manipulated and transformed to conform to common definitions and consistent units of measurement. For example, certain leave data are reported in calendar days taken per year, training data in daily student loads, and medical data in number of visits and average hours per visit.³ Once the data are transformed into hours per month, the

¹About 72 percent of the total NAT, however, could have been based on Air Force administrative records.

²Reporting methods include real time computer reporting through terminals, monthly coded data or administrative forms, quarterly telephone calls, and so on.

³See the 1978 AFMEA study for examples of conversion methods used and some of the assumptions underlying conversion factors.

Table 11
 PERCENTAGE DISTRIBUTION OF SOURCES OF DATA
 FOR AIR FORCE TOTAL NAT, CONUS 40-HOUR WORK WEEK

Non-Available Category	Sources		Category Total
	Survey	Records	
Leave	0.18	32.12	36.30
Medical	14.03 ^a	0.00	14.03
Service diversions	21.07	0.00	21.07
PCS related	2.95	6.29	9.24
Education and training	3.30	13.11	16.41
Social programs	0.00	1.45	1.45
Miscellaneous	0.36	1.19	1.55
Total	41.89	58.16 ^a	100.05 ^b

Source: AFMEA, Report No. 78-1, September 1978.

^aThe 1978 AFMEA Study used the survey results for the medical category to allow for demographic breakdowns; however, data from the Air Force Surgeon General's office yielded similar aggregate medical NAT estimates. Thus, administrative records could have been used for 12 percent of total NAT.

^bDiffers from 100.0 percent because of rounding.

average NAT per person is determined by dividing by the total number of personnel. Because of different and overlapping reporting periods and schemes for various agencies, the time match between the dates on which data were calculated and the size of base population is not always identical.

In addition to problems encountered in the appropriate matching of administrative records with the size of population that may have engaged in the activity at issue, the administrative records may not capture all of the NAT involved in some activities. Most notably, lost time due to service diversions is not maintained as part of existing records. In addition, NAT that results from travel to and from

activities maintained in administrative records is not accounted for. This limitation may be significant for such activities as training and less for such others as medical visits.

Although most of the Services' records for major activities are centrally located and stored on computer files, some of these data are not and require time-consuming collection efforts from various sources; a prime example of the latter category is ancillary training data. In some cases, data are centrally located but not automated; costly retrieval efforts would be involved before they could be used.

DoD-wide estimates of NAT from administrative records would require careful coordination between and within the Services. At a minimum, it would be necessary to understand how administrative records are created and maintained. Issues of population coverage, reporting source, quality verification, etc. all need to be explored. In some cases, existing reporting schemes could be easily modified to allow for analysis by subgroups--for example, CONUS/overseas. In other cases, existing records do not allow for stratification by important demographic characteristics. It may also be necessary to differentiate expected from actual behavior on administrative records. For example, course enrollment rosters reflect "expected" behavior, attendance rosters at the end of a course more accurately reflect actual behavior.

In sum, it is not a foregone conclusion that existing administrative records are to be viewed as the prime source for data to be used in estimates of NAT. The existence of computer files and our ability to manipulate them in sophisticated ways often masks the fact that the data originated from a variety of disparate sources, often on poorly designed forms or records and with little concern for the individuals maintaining them. Although the problems may be different, the use of administrative records requires the same care and caution as does the use of information collected through survey methods. Most important, measurement techniques need to be standardized.

INDUSTRIAL ENGINEERING: AN ALTERNATIVE APPROACH

An alternative method to measure or externally validate NAT factors would be to randomly sample work centers using industrial engineering

techniques in which the total amount of time a worker is engaged in various non-available categories is measured by actual observation. The industrial engineering approach is the only measurement technique that measures NAT as a single value--the observer does not disaggregate non-task activities.

An Air Force Institute of Technology (AFIT) thesis¹ reported statistically significant differences between NAT estimates using surveys and records (27.29 hours/month/man) compared with those obtained from work sampling (29.67 hours/month/man) for a 40-hour workweek. Moreover, there was a negative correlation between the values measured by the two methods--that is, those centers with the highest measured NAT from work-sampling observation had the lowest measured NAT from survey methods and administrative records.²

Because the industrial engineering methods rely on a trained observer to record specific behavior systematically, they may avoid some of the problems that arise both in survey methods and in reliance on data collected from administrative records. We believe this approach is preferable to current methods, but it is uneconomical or impractical. Relying on Air Force Management Engineering Teams (METs) to make the number of observations needed to account for a wide range of assigned workweeks, geographic locations, and seasonal variations and to provide demographic stratification would require an exorbitant number of manhours.

If present NAT measurement techniques are biased upward--that is, estimate more hours than are in fact non-available--then the investment in observational methods may be warranted. A more serious problem with work-sampling methods is that they are not easily adaptable to a requirement for disaggregation of total NAT. This limitation may make it

¹ Captain F. C. Watson and Captain E. H. Simms, "Air Force Manpower Requirements Determination: An Analysis of Worker Non-Availability," Masters thesis, Air Force Institute of Technology, January 1974.

² The AFIT study also found significant differences in NAT depending on officer/enlisted status and paygrade within each. The 1978 AFMEA survey found similar differences for rank and sex.

difficult for policymakers to deal with the components of NAT through the requirements process. Finally, from a practical perspective, the Army and Navy do not have the trained personnel to perform industrial engineering studies of the scale necessary to estimate the wide range of NAT factors.

In sum, small scale work-sampling efforts can be performed to improve manpower requirements determination at the micro level. However, the use of this approach for a comprehensive DoD-wide study of NAT does not seem practical at this time.

IV. SOME ISSUES CONCERNING NON-AVAILABILITY

This section presents some issues that would have to be addressed in any future attempt to measure NAT. These issues bear on four related questions:

- Should NAT be treated as a parameter of the requirements process *not* amenable to manipulation by policy directives?
- How many different NAT parameters should there be for computing manpower requirements?
- What is the relationship between NAT and productivity at the work center level?
- How should NAT tie in with other wartime planning?

Each of these questions raises a number of additional questions, only some of which we will deal with here.

NORMATIVE VS. POSITIVE APPROACHES TO NON-AVAILABILITY

Ostensibly, the current approach to non-availability is to measure the actual behavior of a sample of military personnel and to incorporate the average measured NAT into official service documents. In this positivistic approach, the sanctioned figures conform to measured behavior. In its extreme, this approach treats NAT as a parameter of the requirements process that is *not* amenable to manipulation by policy directives.

In an alternative approach, which we call the normative approach, a Service would stipulate what NAT would be permitted in requirements calculations and, in doing so, would tend to force behavior toward the stated NAT.¹ By choosing a particular aggregate NAT figure, a

¹The argument here centers around the laxity with which an organization views these non-available activities. By sanctioning whatever NAT is measured, an organization loses the means to discourage marginal activities.

policymaker could have an immediate and significant effect on manpower requirements without having to deal with the credibility of the work load measures in the numerator of the manpower equation (p. 2).

Current practice is actually a combination of both of these approaches. For example, the Army measures only ordinary and medical leave in computing NAT for TDA units. All other categories of NAT are ignored for manpower requirements determination--that is, fixed at zero by policy decision.¹ In general, it may not be true that measured NAT and the work load per *assigned* individual at the work center level are independent variables, as is assumed by the manpower equation. An inverse relationship might imply that certain normative judgments are being made by local managers about how much NAT they will "allow" (the normative approach). Using a mix of both the normative and positive approaches may be necessary if measured NAT (the strict positive approach) turns out to be too large to be "politically acceptable."

The positivistic approach may be useful by itself. Knowledge at the OASD level of the amount of time spent on such items as social programs and service diversions, and of their effects on manpower requirements, may force an examination of the value of these activities. In addition, the search for ways to reduce time lost during PCS-related activities, for example, may be intensified if that time were made visible. The normative approach may also produce this effect by encouraging the Services to reduce wasteful procedures in an attempt to conform to an austere allowance for, say, PCS-related NAT.

The question of how often NAT parameters should be updated is related to the issue of the normative or positive approach. If the positive approach is taken, the updating would have to occur frequently in order to maintain the credibility of the NAT parameter; but if the normative approach is taken, updating would have to occur only after it is fairly well agreed that the NAT parameter, or any component, is unreasonable from a manpower requirements point of view.

¹In current practice too, certain policies not promulgated with NAT in mind can influence measured NAT. One example is the policy of prohibiting enlisted personnel from selling back more than 60 days of leave. It is possible that this has increased leave use and thus NAT.

The fundamental approach--normative versus positive--to non-availability is a basic policy decision that OASD(MRA&L) and the Services must make.

NAT PROLIFERATION

Another issue OASD(MRA&L) must decide is how many NAT parameters will be permitted for computing manpower requirements.¹ The matrix of possibilities increases quite rapidly. It is reasonable, for example, to consider having the NAT parameter vary by:

- personal characteristics--e.g., officer/enlisted, male/female;
- geographic location--e.g., CONUS, overseas, remote;
- "state of world"--i.e., wartime or peacetime; and
- type of unit or Military Occupational Specialty (MOS).

The need to account for personal, locational, and wartime NAT differences is apparent, but unit or MOS may not be. Within major units (divisions, wings, installations), there are different needs for training and education between work centers; service diversions are also not likely to be equal. Should these differentials be incorporated into the NAT parameter?

In its extreme, this problem raises another question. Suppose a large percentage of a given type of unit or work center does not engage in some non-available activity. Should the time spent on this activity by the remaining units be spread over all the units? The tradeoff is painfully clear. An assortment of NAT parameters can help sharpen manpower requirements at the unit or work center level, but the data and analysis requirements can increase dramatically as well. A balance and *rationale* in this tradeoff must be decided.

NAT AND PRODUCTIVITY

In making the fundamental choices discussed above--normative versus positive and stratification--it is important to recognize that NAT

¹This issue is related to sample design because stratification parameters need to be defined before a survey is designed or administrative records are used to estimate NAT.

policy can affect *measured* productivity at the work center level. Because the measured productivity of labor is a principal determinant of the numerator of the manpower equation, NAT affects manpower requirements indirectly as well as directly. We believe that the scheduling of NAT activities can raise or lower a work center's measured productivity. Consequently, a NAT policy should embody incentives that encourage the efficient scheduling of NAT activities at each work center.

Scheduling of such NAT activities as annual leave could be planned so as to allow the work center to match demand cycles; of course, other kinds of NAT activities such as sick leave are not as predictable. Productivity might be enhanced if, for example, social programs were scheduled half as often but each class was made twice as long. In general, some management of when NAT activities take place should increase productivity when measured over a sufficiently long, say six-month, period.

CONSISTENCY OF NON-AVAILABLE TIME FACTORS FOR WARTIME

Army TOE unit requirements are predicated on a wartime environment. Leave, training, and PCS-related activities are excluded from the NAT calculation.¹ Certain organizational duties such as "K.P." (kitchen police), guard duty, and work details account for more than 11 percent of assigned TOE time. Aside from the fact that these figures are based on a 1968 study and may therefore be outdated, we question whether using personnel in certain high-skill MOSs for K.P. and guard duty is consistent with sound wartime planning.

The factor allowed for casualties in Army TOE units--3 percent or 130 manhours (about 11 days) on an annual basis--should be related to the time needed to identify, transport, and integrate into the unit an individual replacement for a casualty (or other individual withdrawn from his or her unit for rest and recuperation), and to the probability of such a casualty.² We are unaware of any Army study that treats

¹ Recall that for TOE units the term is non-productive time.

² If each "space" in a TOE unit becomes a casualty exactly once a year, then replacements must arrive within (an average of) 11 days. If each "space" suffers two casualties a year, then replacements must arrive within (an average of) 5.5 days. If only half the "spaces" in a TOE unit become casualties and again this occurs exactly once a year, then replacements must arrive within (an average of) 22 days.

expected TOE casualties, individual replacement time, and NAT due to casualties consistently.¹ Additional questions can be raised here. Should combat, combat support, and support personnel be treated the same with regard to non-productive time, in particular with regard to the casualties factor? Should this factor even be counted if a unit never deploys to a combat zone or deploys only as individuals--i.e., as a filler unit?

OASD must encourage the Services to account for non-productive time for combat units and non-available time for non-combat units in a manner consistent with other wartime planning assumptions and practices. That process requires a multitude of steps and attention to more detailed questions than is appropriate to discuss in this Note. However, some key aspects include determining (1) which units will be needed immediately in wartime, and hence should be manned for wartime; (2) for those units, peacetime and wartime work loads and conditions; (3) for those units, whether the wartime manning is sufficient to perform peacetime tasks as well; (4) how those units with excess capacity in wartime could be used to augment units with insufficient wartime capacity; and (5) how those units with excess capacity in peacetime could be used to augment units with insufficient peacetime capacity.² In other words, wartime manpower planning requires looking across work centers rather than at each work center in isolation.

¹Other issues are tied to the casualties factor as well. For example, the need for the so-called fifth armor crewman might be settled by a more careful measurement of these TOE non-productive factors, particularly the casualties factor.

²There is some evidence that shipboard manning has this last characteristic.

V. SUMMARY AND RECOMMENDATIONS

Each of the sections of this Note has contained recommendations for further exploration and research as part of developing consistent DoD-wide estimates of NAT. The problems with inter-service and intra-service measurement are complex and not amenable to simple solutions. Policy decisions must precede and guide further work. In this final section, we summarize our general conclusions and recommendations and propose a task force approach that would permit the establishment of a DoD-wide methodology for NAT measurement.

GENERAL CONCLUSIONS AND RECOMMENDATIONS

Although our observations on NAT are found throughout this document, we present some of the more salient ones here.

- Improved estimates of NAT will not necessarily improve estimates of manpower requirements. The benefits of improving NAT estimates depend heavily on how accurate the work load measures are. Both problems--NAT and work loads--should be addressed together.
- The Services have different policies regarding which NAT categories are to be allowed, and consequently measured. Even within a category that the Services agree ought to be measured, they disagree on what individual activities should be included. For example, the Army considers significantly fewer non-available activities than the Navy and Air Force for CONUS personnel with a 40-hour standard workweek.
- Using existing staffing documents, it is not possible to ascertain specific NAT estimates within each NAT category for the Army and Navy. Such a disaggregation is calculated by the Air Force.
- The Air Force appears to have the most detailed approach along with the most current data base for estimating NAT.

- The Air Force methodology may not be the most appropriate for the collection of NAT factors for DoD-wide comparisons. We would recommend extensive testing of different time-frames and time-recording methods before the AFMEA questionnaire is adopted.
- The 1978 *DoD Survey of Officers and Enlisted Personnel* pretest revealed that official workweeks bore little resemblance to self-reported workweeks and that respondents had difficulty accurately reporting NAT on an aggregate basis.
- The pretest experience in the four Services surveyed indicated that NAT estimates could not be collected on an omnibus survey, where question space was presumably at a premium. Rather, we would recommend the development of special surveys containing detailed questions that would cover Service-specific NAT activities within a well defined, easy to recall time period.
- Administrative records, although a useful complement to survey data, require the same care and caution as does information collected through survey methods. Measurement techniques for using these records need to be standardized.
- OASD(MRA&L) and the Services must decide early in any program designed to measure NAT whether the normative or positive approach will be taken. The implications of that choice are far-reaching.
- OASD(MRA&L) and the Services must also decide how many different NAT parameters there should be for computing manpower requirements.
- Any resulting NAT policy should embody incentives that encourage the efficient scheduling of NAT activities at each work center.
- OASD(MRA&L) must encourage the Services to account for non-available (non-productive) time for combat units in a manner consistent with other wartime planning assumptions and practices.

THE TASK FORCE APPROACH

Our early discussions of this project with OASD(MRA&L) clearly underestimated the amount and kind of effort that would be required for its execution. We had originally assumed that a general research strategy would be developed, perhaps modeled after the AFMEA effort, and that data collection for each Service would be a minor variant of that strategy. In fact, one is faced with executing four separate and distinct efforts, one for each Service, and a final stage that should compare, coordinate, and synthesize the data for OASD use.

It is also apparent to us that the focus of responsibility for this project belongs inside OASD(MRA&L). The proper organizational placement of such an effort, reflecting the importance attached to the problem, can have major implications for the results. It is difficult to envision a study based in a civilian research organization that would have the required access to resources and command the required attention of a myriad of Service agencies as would an MRA&L-based effort. We have concluded, for example, that the Air Force NAT project could not have been executed outside of an organizational framework such as that of AFMEA.

Apart from organizational or technical feasibility, it has become evident to us that the NAT issues should be viewed as having two separate and distinct components. The first consists of the estimation of NAT parameters in a consistent, or at least comparative, manner across the Services. The second, and one that follows sequentially, is the policy-related assessment and recommendations for modifying or maintaining the observed distribution of NAT.

We recommend that should OASD(MRA&L) wish to improve NAT estimates, a DoD Task Force be formed to undertake coordination of DoD-wide measurement of current NAT factors. A Task Force appears to be the most effective organizational structure for documenting current Service practices and for establishing inter-service definitions, procedures, and measurement policies.

Our recommendation for a Task Force makes the following assumptions about primary and secondary data collection:

- Primary data collection (survey method) would be the responsibility of the Services and would receive proper support. (For example, a complete Army Survey Branch quarterly questionnaire may be required for this effort.) All of the data collection, administration, and initial processing costs would be funded and staffed by the Services.
- Each Service would identify an administrative unit that would be responsible for primary data collection. In the case of the Air Force, the AFMEA MET model exists; for the Army, the channels used to administer the quarterly personnel surveys might be used; for the Navy, the Navy Manpower and Material Analysis Center (NAVMMAC) might be used.
- Access to secondary data sources (existing administrative records) would be expedited and facilitated by the Services. In addition to making data available, agencies would undertake the required technical manipulation and initial transformation of data. Costs for this data processing would be the responsibility of the Services.

With those assumptions, the Task Force might have the following composition:

- Chairman: This individual would have overall design responsibility for the study, scheduling, staffing, and monitoring the work of the Service personnel; presumably, this would be an MRA&L designee.
- Coordinator: This individual would have the responsibility to coordinate and document all activities. This position requires someone with acquired (or previous) technical expertise in the area.
- Service-specific staff: Each of the Services should assign a full-time staff member who would be responsible for the study of NAT in their Service *and* for inter-service tasks. This person is the interface between the Task Force and the Services. The Army and Navy may require more than one person.

- Computer-support staff: The computer-support staff required by the Task Force is a function of the level of support provided by each Service to its representative. At a minimum, one person would be required for inter-Service comparisons and other Task Force-specific analyses.
- Survey support staff: Because some coordination of primary data collection will be required, the Task Force will require staff expertise for form and questionnaire development.

It is our opinion that a competent study of NAT parameters can be completed within an eighteen-month period if a Task Force that includes active participation from the Services is established. A preliminary task outline for such a group, given the staffing and working assumptions outlined above, is provided in Appendix C.

Appendix A

NON-AVAILABILITY SECONDARY DATA SOURCES

Table A.1
AIR FORCE SECONDARY DATA SOURCES

Category	Organization	Source	Location
Leave	Accounting and Finance Center	Computer Files	Denver, Colorado
Medical	Office Surgeon General	Records/ Computer Files	Pentagon
Training	Air Training Command	Computer Files	Randolph AFB San Antonio, Texas
	Air University	Records/ Computer Files	Maxwell AFB Montgomery, Alabama
	Air Force Institute of Technology	Records/ Computer Files	Wright Patterson AFB Columbus, Ohio
	DCS/Personnel	Records/ Computer Files	Pentagon
	MAJCOMS	Records/ Computer Files	
Social Programs	DCS/Personnel	Directives/ Records	Pentagon
Confinement	Office Judge Advocate General	Records/ Computer Files	Pentagon
AWOL/Desertion	Military Personnel Center	Computer Files	Randolph AFB San Antonio, Texas

Table A.2
ARMY SECONDARY DATA SOURCES

Category	Organization	Source	Location
Leave	Finance and Accounting Center	Records/ Computer Files	Ft. Benjamin Harrison Indianapolis, Indiana
Confinement			
Medical			
AWOL/Desertion			
Training/ Social Programs	Training and Doctrine Command	Records	Ft. Monroe Hampton, Virginia
Training/ Social Programs	Health Services Command	Records	Ft. Sam Houston San Antonio, Texas
AWOL/Desertion	Military Personnel Center	Records/ Computer Files	Alexandria, Virginia
Medical	Office of Surgeon General activity	Records/ Computer Files	Ft. Sam Houston San Antonio, Texas

Table A.3
NAVY SECONDARY DATA SOURCES

Category	Organization	Source	Location
Leave	Financial Center	Computer Files	Cleveland, Ohio
Medical ^a	Bureau of Medicine and Surgery	Records/ Computer Files	Naval Annex Arlington, Virginia
Training	Chief, Education and Training	Records/ Computer Files	Naval Air Station Pensacola, Florida
	Chief, Technical Training	Records/ Computer Files	Memphis, Tennessee
	Major Commands	Records	
Social Programs	Bureau of Naval Personnel	Records/ Computer Files	Naval Annex Arlington, Virginia
Confinement			
AWOL/Desertion			

^aIncluding medical training data and social programs data.

49/50

Appendix B

SELECTED ITEMS, 1978 DOD SURVEY OF OFFICERS AND ENLISTED PERSONNEL

**NOW A FEW QUESTIONS ABOUT YOUR WORK SCHEDULE
DURING THE LAST SEVEN DAYS. RECORD YOUR
ANSWERS IN CHART NO. 1 BELOW.**

During the last 7 days, how many hours did you spend . . .

35. . . . working during regular daytime hours — that is, 6:00 a.m. to 6:00 p.m., Monday through Friday?
36. . . . working during hours OTHER THAN regular daytime hours? Please count hours worked during the EVENINGS, AT NIGHT, ON WEEKENDS AND OTHER HOURS NOT INCLUDING 6:00 a.m. to 6:00 p.m., Monday through Friday.
37. Please add the number of hours listed in Q35 and Q36 and enter in the boxes below for Q37.

CHART NO. 1

35. HOURS WORKED DURING REGULAR DAYTIME HOURS	+	36. HOURS WORKED OTHER THAN REGULAR DAYTIME HOURS	=	37. TOTAL HOURS WORKED LAST WEEK
<div>00</div>		<div>00</div>		<div>00</div>
<div>11</div>		<div>11</div>		<div>11</div>
<div>22</div>		<div>22</div>		<div>22</div>
<div>33</div>		<div>33</div>		<div>33</div>
<div>44</div>		<div>44</div>		<div>44</div>
<div>55</div>		<div>55</div>		<div>55</div>
<div>66</div>		<div>66</div>		<div>66</div>
<div>77</div>		<div>77</div>		<div>77</div>
<div>88</div>		<div>88</div>		<div>88</div>
<div>99</div>		<div>99</div>		<div>99</div>

38. Please check: is the number you entered in Q37 the TOTAL NUMBER OF HOURS THAT YOU WORKED DURING THE LAST WEEK? IF NOT, PLEASE CORRECT THE ANSWERS IN THE PRECEDING BOXES FOR Q35, Q36, AND Q37.

39. In the last seven days, how many hours were you on call/on alert status/on a duty roster?

☐ None

<div>00</div>
<div>11</div>
<div>22</div>
<div>33</div>
<div>44</div>
<div>55</div>
<div>66</div>
<div>77</div>
<div>88</div>
<div>99</div>

Appendix C

SUGGESTED TASK FORCE TASKS AND STAFFING
Military Manpower Non-Availability Study

<u>Tasks</u>	<u>Man-Months</u> ¹
1. Initiate and organize study	4
2. Form inter-service Task Force	4
3. Develop detailed Service study plans:	
a. Document all current definitions, sources and related regulations	10
b. Develop inter-service comparability document based on maximum definition of NAT	5
c. Produce inter-service study plan	10
d. Outline analysis methodology and technical specifications	10
e. Identify data sources	5
f. Develop survey questionnaire and pretest	6
4. Data Collection:	
a. Assemble all secondary data	10
--Develop standard format	
--Prepare for data processing	
b. Collect primary data	20
--Identify administrative structure and task	
--Write administrative procedures	
--Select sample	
--Print questionnaires	
--Distribute questionnaires	
--Field period	
--Process survey data	
5. Data Analysis	24
a. Collect current strength data, possibly	
--Type of work week	
--CONUS vs. overseas	
--Ashore vs. at sea	
--Military vs. civilian	
--Grade distribution	

¹Excludes staff for survey administration editing and processing as well as computer and secretarial support for the Task Force.

--Sex discrimination	
--Years of service, etc.	
b. Calculate NAT by activity	
c. Compute man-hour availability factors	
--For each type of work week	
--For each strata of data	
d. Perform comparative analysis	
--Across stratified data within Service	
--Across stratified data between Services	
6. Documentation and Reports	10
a. Executive summary of results	
b. Methodology	
c. Data sources	
d. Possible policy inferences	
Total man-months =	118

DATE
ILME